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Sunil Marpa
FEEDS-Krishi Vigyan Kendra, Sylvan Hengbung, P.O. Kankpokpi, Manipur, India

SS Samant
Himalyan Forest Research Institute, Conifer Campus, Panthaghati, Shimla, Himachal Pradesh, India

Ashish Tewari
Department of Forestry and Environmental Science, D. S. B. Campus, Kumaun University, Nainital, Uttarakhand, India

Shiv Paul
G. B. Pant National Institute of Himalayan Environment, Himachal Regional Centre, Mohal - Kullu, Himachal Pradesh, India

Corresponding Author:
Sunil Marpa
FEEDS-Krishi Vigyan Kendra, Sylvan Hengbung, P.O. Kankpokpi, Manipur, India

Diversity and indigenous uses of plants in Naina Devi Sacred Shrine Rewalsar, Himachal Pradesh, North Western Himalaya, India

Sunil Marpa, SS Samant, Ashish Tewari and Shiv Paul

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Abstract
The analysis of the diversity, distribution and indigenous uses of plants in and around a Naina Devi Sacred Shrine Rewalsar of Mandi district in Himachal Pradesh were carried out from 2009-2014. A total of 169 species of plants belonging to 71 families and 136 genera were recorded. Among these ecologically and economically important species, tree (20 spp.), shrub (41 spp.), herb (91 spp.) were present. The species were used as medicine (117 spp.), wild edible/food (49 spp.), fuel (27 spp.), fodder (54 spp.), and religious (11 spp.) by the inhabitants of the area. The paper gives scientific name of wild plants along with authority, local names, family, life form, indigenous uses and plant part used by the local people of the region. Different parts of these species, such as whole plants, roots, leaves, flowers, fruits, seeds and stems are used by the inhabitants for remedial various diseases.

Keywords: Diversity, indigenous uses, utilization pattern, sacred shrine

Introduction
The Indian Himalayan Region (IHR) shows an abundant biodiversity and the natives living the rural areas are largely dependent upon this wealth. The relationship among native communities and plant wealth is strongly revealed by well developed traditional health care practices and a variety of plant uses in ceremonies, routine household uses and trading for economic gain (Singh, 1999) [35]. The rural poor depend upon biological resources for meeting 90% of their day-to-day needs (Totey and Verma, 1996) [39]. Of which, fuel wood and fodder are two important and critical components of village economy especially in the hills. In the Himalaya, 76% of total natural resource needs are derived from forests and agroforestry systems, mainly because they are free, easy to access and simple to use (Chettri and Sharma, 2006) [4]. The growing commercial trade of natural products, in particular plant medicines and crafts, has resulted in the harvest of increasing volumes from wild plant populations (Lange, 1998) [14] and has therefore generated concern about overexploitation (Tiwari, 2000) [38]. For centuries tropical, sub-tropical and temperate forests have experienced intensive human activity across the globe (Heywood and Watson, 1995) [7]. Like other parts of India, in the Indian Himalaya, most of the people live in villages and use plants as medicine, edible/food, fodder, fuel, timber, agricultural tools and various other purposes (Samant and Dhar, 1997) [21]. From the IHR, 1748 medicinal plants (Samant *et al.*, 1998) [20, 25], 675 wild edibles (Samant and Dhar, 1997) [21], 279 fodder (Samant, 1998) [20, 25], 118 essential oil yielding medicinal and aromatic plants (Samant and Palni, 2000) [22] and 155 sacred plants (Samant and Pant, 2003) [23] have been recorded. Himachal Pradesh, one of the Himalayan States, is blessed with rich biodiversity. It has a multitude of floral species to suit the local needs and site conditions. This treasure of useful raw materials has been exploited by the local people in a variety of ways. The local people mostly depend on biological resources for medicine, food/edible, fodder, fuel, timber, agricultural tools, fiber, dyes, aesthetic values and various other purposes. (Samant *et al*, 2007a) [24]**.** The review of available literature showed that in general, in Himachal Pradesh, a large number of studies have been carried out on ethnobotany including medicinal plants (Chauhan, 1996 and 1999; Sharma and Lal, 2005; Samant *et al.*, 2007b; Rawat *et al.*, 2009; Singh *et al.*, 2009; Rana and Samant, 2011; Samant *et al.*, 2010 and 2011; Kaur *et al*., 2011; Sharma *et al.*, 2011; Thaplyal *et al.*, 2012; Kumar and Chander, 2018a and b; Rana *et al*.,

2019; etc.) [2, 3, 33, 28, 19, 34, 18, 30, 9, 32, 37, 12, 13 17]. Inspite of the efforts of the above workers many biodiversity rich areas are still unexplored or underexplored including Sacred Shrines. Comprehensive studies on the status and distribution pattern of economically important species are essentially required so that pressure on the economically important species could be investigated and adequate management plan for their conservation could be developed. In view of this, an attempt has been made to; (i) assess the diversity, distribution, utilization pattern and indigenous uses of economically important species; (ii) identify species preference; and (iii) generate data and suggest strategies contributing to the management for conservation and sustainable use of economically important resources.

Materials and methods

Study Area: The Naina Devi Sacred Shrine Rewalsar - Mandi (NDSSM) (31º37'38" N latitude and 76°48'20" E longitude) is located in District Mandi (Fig. 1). It is 12 km away from Rewalsar. The area is unique and beautiful and known for its seven lakes "Saatsar" and colour of water in each laker is different. The vegetation is sub-tropical and temperate type. The area is mostly hilly. The soil is generally alluvial and Sandy-loamy and with exceptions of clay patches. The climate is sub-tropical and temperate type. Broadly four distinct seasons can be delineated, namely, winter (middle of December to February), summer (March to June), rainy (early July to the middle of September) and autumn (October to November). Winter is mild in low-lying area, whereas it snow on high mountain ranges. Springs are warm and sunny. Rainy season is the wettest part of the year and characterized by high humidity. Summers are prickly hot during monsoon month. The vegetation includes sub-tropical, temperate and sub-alpine broad leaved and coniferous forests and supports a large number of sensitive biodiversity elements including medicinal and aromatic plants, wild edibles, native, near endemic and wild relatives of crop plants. The forests are characterized by; (i) evergreen coniferous forests mainly of *Pinus roxburghii* and *Cedrus deodara*; and (ii) evergreen broad leaved forests of *Myrica esculenta, Quercus oblongata* and *Rhododendron arboreum*. The forest types support a large number of biodiversity elements. Besides, the notable faunal components are Leopard (*Panthera pardus* L.), Himalayan Black Bear (*Selenarctos thibetanus* Cuvier), Jungle cat (*Felis chaus* Guld.), Indian Fox (*Vulpes bengalensis* Shaw), Himalayan Pine Martin (*Martes flavigula* Bodd.) and Indian Porcupine (*Hystrix indica* Kerr.), Blue Rock Pigeon (*Columba intermedia* Srickl.), Dove (*Streptopelia decaocto* Lath.), Jungle Myne (*Acridotheres fuscus* Wangl.), Kaleej Pheasant (*Lophura leucomelanos* Lath.), Cheer Pheasant (*Catreus wallichii* Hardw.), *etc.* In spite of the religious importance of NDSSM, the surrounding areas of the shrine are facing tremendous pressure as the inhabitants are dependent of floristic diversity for medicine, wild edibles, fuel, fodder, timber, making agricultural tools, religious and various other purposes.

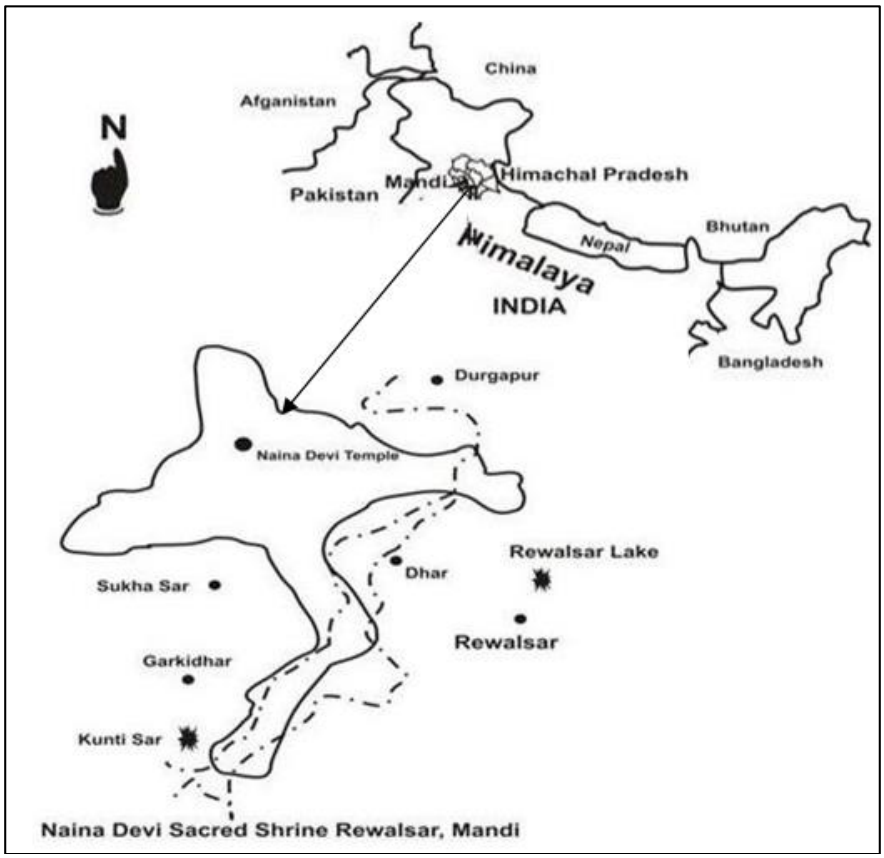

Fig 1: Map of the study area showing Naina Devi Sacred Shrine Rewalsar Mandi

Assessment of Resource Utilization Pattern: The representative villages namely Sarkidhar, Dhar, Garloni and Laheda in NDSSRM were selected to generate information on resource utilization pattern of the inhabitants. Local *Vaidhyas* and knowledgeable persons from each village were interviewed, irrespective of their age or gender. The interviews were mostly individual, except in some cases, where several people participated at the same time. Interviews did not follow a previously-defined strict questionnaire; it consisted of open and semi-structured questions, which encouraged the interviewee's spontaneous participation. The language used with the informants was the local dialect of the

study area *viz.* Mandyali and Hindi. As part of the interviews, among the village experts, one person was hired to survey and collect the samples of the economically important plants from the natural habitats for further identification. Information on local name of the plant, plant part used to cure the ailment and the ailment for which it is used, altitudinal range, habit, habitat/s, and use values was gathered. The plants with ≥ 03 uses are considered as multipurpose plants. Fresh samples of the useful species were collected and identified with the help of local and regional floras (Chowdhery and Wadhawa, 1984; Aswal and Mehrotra, 1994; Dhaliwal and Sharma, 1999; Singh and Rawat, 2000; Khullar, 1994&2000, *etc.*) [5, 1, 6, 36, 10, 11]. Information on mode of utilization of medicinal plants was collected. Regarding the external use of the plant, the most common is as poultice and as ointment, prepared by macerating the useful part to cure diseases and heal the wounds. For the internal use, as per the requirement, decoction of the part with hot water, milk or honey is prepared and given to the patients 2 or 3 times in a day (Samant *et al.*, 1998) [20, 25]. Infusion is another popular method of preparation for oral administration in the present investigated area. The indigenous uses are based on the surveys, however in the case of medicinal plants information on indigenous uses has also been updated with the help of existing secondary information (Jain, 1991; Samant and Palni, 2000; Samant *et al.*, 2001, 2007a&b) [8, 22, 24]. Some of the species of medicinal plants are not used by the inhabitants, but their uses as medicine are known from other parts of the State and IHR. Such species have also been included under medicinal plants. The wild edibles are either eaten fresh, boiled, cooked or in the form of dried or liquid products (Samant and Dhar, 1997) [21]. Fodder is either fed fresh or stored after drying to use during the lean period. For nomenclature, The Plant List, and International Plant Name Index (IPNI) were followed. The information was compiled and analyzed for the utilization pattern following Samant *et al.* (2007a) [24].

Results

Diversity and Utilization Pattern of Economically Important Plants: In NDSSRM, total 163 species (Angiosperms: 155; Gymnosperms: 02 and Pteridophytes: 06) of the economically important plants belonging to 71 families and 136 genera were recorded (Table 1). The dominant families were Compositae (19 spp.), Poaceae and Rosaceae (11 spp., each), Lamiaceae (10 spp.), and Leguminosae (9 spp.). Among genera, *Arisaema* (04 spp.), *Artemisia*, *Erigeron*, *Ficus*, *Indigofera* and *Rubus* (03 spp., each) were the dominant genera. Total 46 families *viz.*, Anacardiaceae, Asparagaceae, Aspleniaceae, Athyriaceae, Berberidaceae, Betulaceae, Brassicaceae, Buxaceae, Capparaceae, Caprifoliaceae, Caryophyllaceae, Celastraceae, Cornaceae, Cryptogrammaceae, Cucurbitaceae, Cyperaceae, Dioscoreaceae, Elaeagnaceae, Equisetaceae, Fagaceae, Gentianaceae, Geraniaceae, Hydrangeaceae, Hypericaceae, Juncaceae, Lythraceae, Melastomataceae, Menispermaceae, Myricaceae, Myrtaceae, Orobanchaceae, Plumbaginaceae, Primulaceae, Pteridaceae, Rhamnaceae, Rutaceae, Salicaceae, Santalaceae, Simaroubaceae, Smilacaceae, Solanaceae, Symplocaceae, Thelypteridaceae, Violaceae, Vitaceae and Zingiberaceae were reported as monotypic.

Table 1: Taxonomic description of economically important plants in the NDSSRM

Taxonomic Group	Family	Genera	Species	Herbs	Shrubs	Trees	Ferns
Angiosperms	64	128	155	91	41	18	-
Gymnosperms	1	2	2	-	-	2	-
Pteridophytes	6	6	6	-	-	-	6
Total	71	136	163	91	41	20	6

Nativity and Endemism: Of the total 163 economically important plants recorded, 49 species were native to Indian Himalayan Region (IHR); 22 species were native to IHR and other countries together; and remaining species were non native to IHR. 15 species *i.e.*, *Ainsliaea aptera*, *Arisaema intermedium*, *A. jacquemontii*, *Berberis lycium*, *Cedrus deodara*, *Cirsium wallichii*, *Daphne papyracea*, *Deutzia staminea*, *Gerbera gossypina*, *Hedychium spicatum*, *Lespedeza gerardiana*, *Pinus roxburghii*, *Rosularia rosulata*, *Salvia mukerjeei* and *Selinum tenuifolium* were near-endemic to IHR. (Table 2 and Fig. 2).

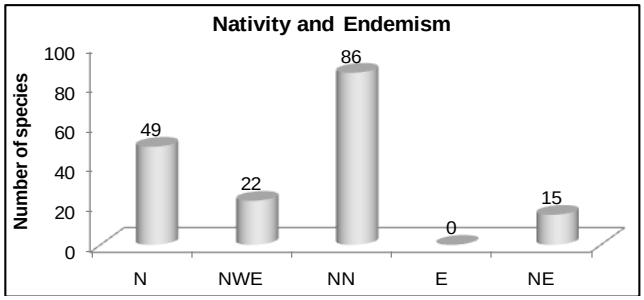

Fig 2: Diversity of Native (N), Non-Native (NN), Native with Extension (NWE), Endemic (E) and Near-Endemic (NE) species of NDSSRM

Uttilization Pattern: Amongst 163 economically important species, 117 were used as medicine, 54 fodder, 49 wild edible/food, 27 fuel, 11 religious, 04 fibres, 04 timber, 03 for making agricultural tools, 03 dye and 04 for other purposes (Fig. 3). Among the parts of the plants used, leaf was used in majority of cases (59 spp.), followed by whole plant (47 spp.), root (34 spp.) and fruit (26 spp.) (Fig. 4 and Table 2).

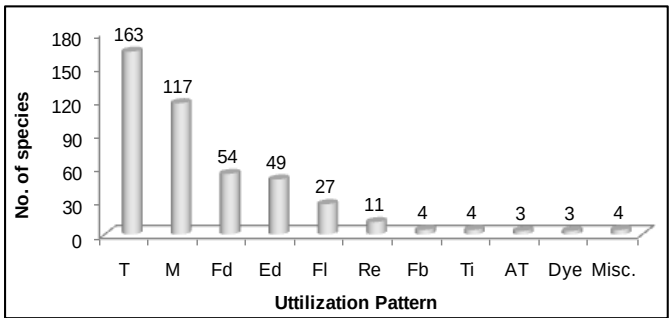

Fig 3: Diversity and utilization pattern of economically important species in the Naina Devi Rewalsar.

Abbreviations Used: T=Total; M=Medicinal; Fd=Fodder; Fl=Fuel; Ed=Edible; Re=Religious; Fb=Fibre; Ti=Timber; AT=Agricultural Tools; and Misc. = Miscellaneous

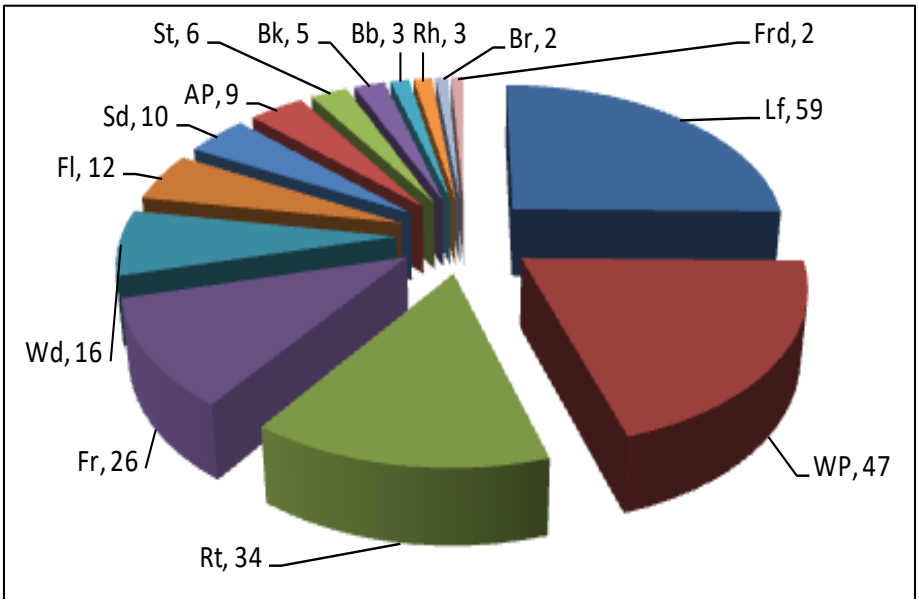

Fig 4: Statistics of plant parts used.
Abbreviations Used: Lf=Leaf; WP=Whole plant; Rt=Root; Fr=Fruit; Wd=Wood; Fl=Flower; Sd=Seed; AP=Aerial part; St=Stem; Bk=Bark; Bb=Bulb; Rh=Rhizome; Br=Bract; and Frd=Frond

Threat Status: As per CAMP (Conservation Assessment and Management Prioritisation) *Dioscorea deltoidea* was Endangared and *Zanthoxylum armatum* was Vulnerable (Ved *et al*., 2003) [40]. *Dioscorea deltoidea* was Vulnerable as per Red Data Book (Nayar and Sastry, 1987, 1988 and 1990) [15]. Four species (i.e., *Arisaema jacquemontii***,** *Sauromatum venosum*, *Cedrus deodara* and *Pinus roxburghii* were under Least Concern category of IUCN (International Union for Conservation of Nature).

Species preference: Among the medicinal plants, *Ajuga integrifolia*, *Asparagus racemosus*, *Berberis lyceum*, *Capparis zeylanica*, *Cuscuta reflexa*, *Hedychium spicatum*, *Origanum vulgare*, *Pistacia chinensis* ssp. *integerrima*, *Rhododendron arboreum*, *Selinum tenuifolium*, *Viola canescens*, *Zanthoxylum armatum* were highly preffered; fuel, *Quercus oblongata*, *Cedrus deodara*, *Prunus cerasoides*, *Lonicera quinquelocularis*, *Myrica esculenta* and *Pinus roxburghii*; fodder, *Sarcococca pruniformis*, *Albizia lebbeck*, *Trifolium pretense*, *Quercus oblongata*, *Lonicera quinqulocularis* and *Indigofera atropurpurea*; wild edibles, *Myrica esculenta*, *Elaeagnus conferta*, *Diplazium esculentum*, *Phyllanthus emblica*, *Berberis lyceum*, *Rubus biflorus*, *Rubus ellipticus* and *Dioscorea deltoidea*; agricultural tools, *Rhamnus purpurea*, *Symplocos paniculata*, and *Pinus roxburghii*; religious *Selinum tenuifolium*, *Artemisia nilagirica*, *Phyllanthus emblica*, *Origanum vulgare* and *Saccharum rufipilum*; and timber, *Quercus oblongata*, *Cedrus deodara*, and *Pinus roxburghii* were the highly preferred species. *Quercus oblongata* (Ban oak) was found to be a dominant multipurpose tree species. It was heavily lopped as fodder, fuel wood and to prepare agricultural implements throughout the study area starting from low altitude to the higher altitude villages. Among the preferred medicinal plants, flowers of *Rhododendron arboreum*, rhizome of *Hedychium spicatum*, roots of *Berberis lycium* and fruits of *Myrica esculenta* were traded by the inhabitants.

Discussion

In the Himalaya the Communities have developed an age old tradition of using a wide variety of forest resources for firewood, fodder, timber. (Rai *et al*., 2002) [16]. These communities have varying levels of dependency *i.e*., medicine, wild edible, fodder, fuel, timber, making agricultural tools, fibres *etc*. on the forests based on their socio-economic structure (Samant and Dhar, 1997; Samant *et al*., 1998, 2000, 2006, 2007a&b) [21, 20, 24, 25, 29]. Overall, occurrence of 163 species (Angiosperms: 155; Gymnosperms: 02 and Pteridophytes: 06) of the economically important plants belonging to 71 families and 136 genera indicates richness and high socio-economic value of these sacred shrines. Use of these species as medicinal (117 spp.), fodder (54 spp.), wild edible/food (49 spp.), fuel (27 spp.), religious (11 spp.), timber (04 spp.), making agricultural tools (03 spp.), dyes (03) and various other purposes (04 spp.) shows that these species are very important for the sustenance of the inhabitants. The predominating families in the sacred shrine were Compositae (19 spp.), Poaceae and Rosaceae (11 spp., each), Lamiaceae (10 spp.), and Leguminosae (9 spp.), showing their rich gene pool.

The over exploitation of multipurpose utility plants and certain highly preferred species are facing high pressure. Such plants include *Quercus oblongata*, *Cedrus deodara*, *Hedychium spicatum*, *Dioscorea deltoidea*, *Myrica esculenta*, *Elaeagnus conferta*, *Diplazium esculentum*, *Phyllanthus emblica* and *Berberis lyceum*. The continuous extraction of these species from the wild for trade has caused increased pressure. Such continued practices will cause the loss of these species and also, loss of moisture, humus content which will lead soil erosion and finally, habitat degradation (Samant *et al*., 2000, 2006) [29]. In addition to it, spread of weeds and abnoxious exotic species has also led to threat to the natural vegetation of the area. Promotion of planned collections may help for the sustainable utilization of such high value species. The Forests have been subjected to lopping, and felling of trees, and grazing by cattle's. It has been observed that due to unplanned collection of the resources, ecology of the forests has been seriously affected (Samant, *et al*., 2000) [27]. Therefore, conservation measures have to be taken to maintain the current status of these habitats, species and communities. Awareness among the villagers need to be created for the resource utilization techniques, so that

sustainable utilization of the species could be done by the villagers and mass multiplication through conventional and *in-vitro* methods of economically important species facing high anthropogenic pressures and their establishment and maintenance in in-situ and ex-situ conditions may help in their conservation and management. In addition, the degraded forests may be re-established through plantations of the seedlings of the preferred medicinal, wild edibles, fuel fodder and timber species with the participation of local inhabitants.

Conclusion

The present study recorded 163 species economically important plants from Naina Devi Sacred Shrine Rewalsar of Mandi district in Himachal Pradesh for the first time. The study revealed that the inhabitants/native communities of surrounding villages are largely dependent upon the surrounding plant resources to meet their day to day requirements. The inhabitants are the store house of traditional knowledge particularly about the use of economically important species. The over exploitation of propagating parts such as roots, rhizomes, tubers, bulbs and seeds by the inhabitants in the area may lead rapid population depletion of the species. Similarly, high preference and multiple utility of the species, continuous utilization and over exploitation may lead not only decline in their number and availability but, also may lead their extinction in near future. Therefore, frequest monitoring of populations of these species in relation to climate change, and education and awareness among the local inhabitants and Forest Department Officials are suggested for the conservation management of this rich wealth for posterity.

Table 2. Taxa with family, local names, life form, part used of economically importnant plants in NDSSRM

Families/Taxa	Local Name	LF	Parts used	Uses	Nativity
Angiosperms					
Acanthaceae					
Barleria cristata L.	-	H	WP	Medicinal (Anaemia, body pain, headache, swelling in legs, toothache); Edible	Ind Or Burma
Dicliptera chinensis (L.) Juss	-	H	WP	Medicinal (Tonic)	As Trop
Goldfussia dalhousiana Nees.	-	H	WP	Fodder	Reg Himal
Anacardiaceae					
Pistacia chinensis ssp. *integerrima* (J. L. Stewart ex Brandis) Rech. f.	Kakarsinghi	T	Fr	Medicinal (Tonic, expectorant, cough, asthma, fever, appetite, irritability of the stomach, chronic pulmonary affection, dyspeptic, vomiting and diarrhoea); Edible; Fodder; Timber; Dye	Reg Himal Aegypt Persia China
Apiaceae					
Cyclospermum leptophyllum (Pers.) Sprague	-	H	Fr	Medicinal (Germicide, finds wide application as a disinfectant and antiseptic of rather pleasant odor. flavoring of all kinds of food products, meats, sauces and canned food)	Austr
Bupleurum hamiltonii N. P. Balakr.	-	H	WP	Fodder	Nepal (Indian Subcontinent As Trop)
Chaerophyllum villosum Wall. ex DC.	-	H	Rt	Edible	Reg Himal
Pimpinella diversifolia DC.	-	H	Rt	Medicinal (Cold, cough, digestive disorder)	Reg Himal
Selinum tenuifolium Wall.*	Matoshal	H	WP	Medicinal (Incense, insecticidal, nervine tonic, sedative); Religious	Reg Himal
Trachydium roylei L.	-	H	AP	Fodder	Reg Himal Ind Or
Araceae					
Arisaema flavum (Forsk.) Schott	Kira aloo	H	Bb	Medicinal (Skin disease)	Arabia
A. intermedium Bl.*	Kira aloo	H	Bb	Medicinal (Ringworm, skin diseases)	Reg Himal
A. jacquemontii Bl.*	Kira aloo	H	Bb	Medicinal (Ringworm and other skin diseases)	Reg Himal
A. tortuosum (Wall.) Schott	Kira aloo	H	WP	Medicinal (Veterinary diseases)	Reg Himal
Sauromatum venosum (Dryand. ex Aiton) Kunth.	-	H	Tu	Medicinal (Skin disease, tumors, veterinery sores); Edible	Ind Bor Occ
Araliaceae					
Hedera nepalensis Koch.	Katari	Sh	Fr, Lf	Medicinal (Cold, cough, stimulant, diaphoretic, cathartic, rheumatism); Edible	Reg Himal Europe Afr Bor As Temp
Hydrocotyle javanica Thunb.	-	H	Lf	Medicinal (Dysentery, indigestion, fever)	Java
Apocynaceae					
Ceropegia longifolia wall.	-	H	Tu	Edible	Reg Himal
Cryptolepis dubia (Burm.f.) M.R.Almeida	-	Sh	WP	Medicinal (Rickets); Fibre	Ind Or
Asparagaceae					
Asparagus racemosus Willd.	Sansarpali	Sh	Tu	Medicinal (Anthelmintic, aphrodisiac, rheumatism, bleeding from nose, cough, dysentery, febrifuge, gastric complaints, gonohorrea, headache, menustral complaints, snake bite, stomachache, tonic, urine complaints); Edible	Ind Or Afr Trop Austr

Berberidaceae					
Berberis lycium Royle*	Kshambal	Sh	Rt, Fr	Medicinal (Jaundice, eye diseases); Edible; Fuel	Reg Himal
Betulaceae					
Carpinus viminea Lindl.	Cham-Khadik	T	Wd	Fuel	Reg Himal
Brassicaceae					
Cardamine impatiens L.	-	H	St	Medicinal (Tonic); Edible	Europe As
Buxaceae					
Sarcococca pruniformis Lindl.	Rawal	Sh	Lf, Fl	Fodder; Fibre; Religious	Ind Or Malaya
Capparaceae					
Capparis zeylanica L.	-	Sh	Wp	Medicinal (Antihelminthes, blisters, boils, cholera, colic, pneumonia, piles, rheumatism, snake bite, swell testicle, ulcer); Edible	Ind Or
Caprifoliaceae					
Lonicera quinquelocularis Hardw.	-	Sh	Lf, Wd	Fodder; Fuel	Reg Himal
Caryophyllaceae					
Stellaria media (L.) Villars	-	H	WP	Medicinal (Bone fracture); Edible	Reg Himal Louisiana (SE USA N Amer)
Celastraceae					
Euonymus lucidus D. Don	-	T	Rt, Bk, Lf	Medicinal (Dysentery, eye diseases, headache)	Reg Himal
Commelinaceae					
Commelina paludosa Bl.	-	H	WP	Medicinal (On insect stings)	Ind Or Malaya
Cyanotis cristata (L.) Don	-	H	Lf	Medicinal (Applied to sores); Fodder; Edible	Ind Or Malaya
C. vaga (Lour.) J. A. and J. H. Schult.	-	H	AP	Edible	Java
Compositae					
Ainsliaea aptera DC.*	Sath jalari	H	Rt	Medicinal (Stomachache)	Reg Himal
Ageratum conyzoides L.	Karu-buti	H	Lf, Rt, Sd, Fr, Fl	Medicinal (Antilithic for kidney stone, antiseptic, boils, burns, cancer, cuts, diarrhoea, headache, leprosy, muscular pain, piles, ringworn, scabies, snake bite, sores, swellings, tumor, uterine disorders, hair problems, wounds); Edible	Reg Trop Amer
Anaphalis royleana DC.	-	H	Fl	Used as an incense	Reg Himal
Artemisia japonica Pamp.	-	H	Lf	Medicinal (decoction, treatment of vaginitis, skin diseases)	Japon Ind Or Burma
A. nilagirica (Cl.) Pamp.	-	Sh	Wp	Medicinal (Antialergic, headache, menstral problem, insect replent); Religious	Reg Temp Bor
A. parviflora Roxb. ex D. Don	Jhau	H	Lf, Rt, Sd	Medicinal (Carminative, wormifuge, throat problems); Fodder	Ind Or Burma
Bidens biternata (Lour.) Merr. and Sherff.	-	H	Fr, Lf, Fl, Rt	Medicinal (Apetizer, cough, cuts, inflammation, snake bite, sores, toothache, ulcers); Edible	Reg Trop
B. pilosa L	-	H	WP	Medicinal (Cough, cuts, ear and eye complaints, headache, inflammation, leprosy, skin diseases, snake bite, sores, wounds); Edible	Reg Trop
Blumea laciniata (Roxb.) DC.	-	H	Lf	Medicinal (Eczema, skin disease)	Ind Or Malaya
Cirsium wallichii DC.*	-	H	WP	Medicinal (Swelling, headache, pneumonia)	Reg Himal
Erigeron trilobus (Decne.) Boiss.	-	H	WP	Medicinal (Bone fracture, swelling)	Ind Or Afr Trop
E. bonariensis L.	-	H	Lf	Medicinal (Rheumatism, mouth, throat and skin diseases)	Amer Austr
E. canadensis L.	-	H	WP	Fodder	Amer Austr
Gerbera gossypina (Royle) Beauv.*	Bach	H	Rt	Medicinal (Blood pressure, gastric disorders)	Reg Himal
Pseudognaphalium hypoleucum (DC.) Hilliard and B. L.Burtt	-	H	WP	Medicinal (Cuts, wounds)	As Trop
Inula cappa (Buch.-Ham. ex D. Don) DC.	-	Sh	Lf	Medicinal (Headache, urinary complaints); Fodder	Reg Himal Java China
I. cuspidata Hk. f.	-	Sh	Lf	Fodder	Reg Himal
Senecio nudicaulis Buch.-Ham.	-	H	Rt	Medicinal (Cough, cold)	Reg Himal
Sigesbeckia orientalis L.	-	H	Wp	Medicinal (Boils, sores, ulcer, cardic ailm, skin disease)	Cosmop Trop
Convolvulaceae					

Convolvulus arvensis L.	-	H	Wp	Medicinal (Purgative, burns, bruises); Detergent	Geron Temp
Evolvulus alsinoides (L.) L.	-	H	Wp	Medicinal (Asthma, fever, scorpion sting, stomachace); Religious	Amphig Trop
Cuscuta reflexa Roxb.	Amar bel	H	Wp	Medicinal (Bodyache, burns, cuts, nervien weekness, swell of legs, body part, Veterinery, kills lice)	Ind Or
Cornaceae					
Cornus macrophylla Wall.	Kirchhan	T	Fr, Wd, Lf	Fodder; Fuel; Edible	Reg Himal China Japon
Crassulaceae					
Kalanchoe integra (Medik.) Kuntze		H	Lf	Medicinal (healing for scar)	As Trop
Rosularia rosulata (Edgew.) H. Ohba*	Moshu gha	H	Lf	Medicinal (Skin disease)	Reg Himal
Cucurbitaceae					
Solena amplexicaulis (Lam.) Gandhi	Balakakri	H	Rt, Lf, Fr	Medicinal (Antifertility, cuts, diabetes, fever, stomachache); Edible; Fodder	As Trop
Cyperaceae					
Carex cruciata Wahlenb.	Dastana ghas	H	Wp	Fodder	Ind Or China
Dioscoreaceae					
Dioscorea deltoidea Wall. ex Kunth	Shingli-mingli	H	Tu	Medicinal (Dysentery, piles); Edible	Ind Or
Elaeagnaceae					
Elaeagnus conferta Roxb.	Ghaiyeen	Sh	Fl, Fr	Medicinal (Sores, ulcer); Edible	Ind Or As Trop Japan
Ericaceae					
Lyonia ovalifolia (Wall.) Drude	Bheral	T	WP	Medicinal (Boils, pimples, skin diseases, wormifuge, wounds); Fuel	Reg Himal Japon
Rhododendron arboreum Sm.	Brah	T	Fl, Lf	Medicinal (Dysentery, fever, headache, rheumatism, wounds, nose bleeding); Edible; Religious; Fuel	Ind Or Reg Himal
Euphorbiaceae					
Phyllanthus emblica L.		T	Wp	Medicinal (Constipation, skin problem, hair tonic); Edible, Religious	As Trop
Euphorbia hirta L.	Dhudhi	H	Wp	Medicinal (Antidote in snake bite, asthma, boils of mouth, kideny disease, pain in joints, veterinery. bone fracture); Edible	Amphig Trop
E. prolifera Buch.-Ham. ex D.Don		H	WP	Fodder	Reg Himal
Glochidion velutinum Juss.		T	Lf, St	Fuel; Dye	Ind Or Malaya
Fagaceae	-				
Quercus oblongata D. Don	Ban	T	Wd, Lf	Fodder; Fuel; Timber	Reg Himal
Gentianaceae					
Swertia angustifolia Ham. ex D. Don	Chirayata	H	WP	Medicinal (Malarial fever)	Reg Himal
Geraniaceae					
Geranium nepalense Sw.	Tirahni	H	Rt	Medicinal (Cuts, jaundice, toothache, ulcer, wounds, stomach complaints); Dye	Ind Or China
Hydrangeaceae					
Deutzia staminea R. Br. ex Wall.*	Dendhru	Sh	Lf, Wd	Fodder; Fuel	Reg Himal
Hypericaceae					
Hypericum japonicum Thunb.	Basanti	H	WP	Medicinal (Skin diseases)	As Temp Or Austr
Juncaceae					
Juncus bufonius L.	-	H	AP	Fodder	Amphig
Lamiaceae					
Ajuga integrifolia Buch.-Ham.	Neelkanthi	H	Lf	Medicinal (Ascariasis)	Afr Trop Ind Or As Or
Pseudocaryopteris foetida (D.Don) P.D.Cantino	-	H	Lf	Medicinal (Wounds); Fodder	Reg Himal
Colebrookea oppositifolia Sm.	-	Sh	Lf	Medicinal (Cough, sores, wounds)	Ind Or Burma
Micromeria biflora (Buch.-Ham.) Benth.	-	H	Lf	Medicinal (Cold, gastroenteritis)	Ind Or Arab Afr Trop
Nepeta ciliaris Benth	-	H	Lf	Medicinal (Malarial fever)	Reg Himal
Origanum vulgare L.	Ban tulsi	H	WP	Medicinal (Cold, fever, hysteria, influenza, menstrual complaints, stimulant, tonic); Edible; Religious	Europe As et Afr
Isodon lophanthoides var. *graciliflorus* (Benth.) H. Hara	-	H	Lf	Medicinal (Cuts,wounds)	Reg Himal
Salvia mukerjeei Bennet and Raizada*	Gawandru	H	Rt, Lf, Fl	Medicinal (Astringent, colic, cold, cough)	Reg Himal

S. nubicola Wall. ex Sw.	-	H	Lf, Rt	Medicinal (Wounds, cold, cough)	Europe Austr Oriens Reg Himal
Vitex negundo L.	-	Sh	Wp	Medicinal (Blister, bone fracture, bodyache, cold, colic, diarrhoea, epilepsy, fever, gout, gum trouble, headache, itch, mental disturbance, piles, reduce sex desire, skin problem, tonic, ulcer) Insect repellent; Religious; Household	As Trop et Subtrop
Leguminosae					
Desmodium gangeticum (L.) DC.	-	Sh	WP	Medicinal (Antidote to snake venom, cough, dysentery, eye infection, fever, tonic, vomiting); Fodder	As Trop Austr
Indigofera atropurpurea Horn.	Kathi	Sh	Lf, Wd	Fuel; Fodder	Reg Himal China
I. cassioides Rottl. ex DC	-	Sh	Rt	Medicinal (Cough, pains in chest)	Reg Himal
I. heterantha Brandis	Kali Kathi	Sh	Rt, Fl	Medicinal (Veterinery Medicinal urine problem); Edible	Reg Himal
Lespedeza gerardiana Grah. ex Maxim.*	-	H	Lf	Fodder	Reg Himal
Trifolium pratense L.	Malori	H	WP	Fodder	Europe As Temp
T. repens L.	Malori	H	WP	Medicinal (Astringent); Fodder	Geront Bor Temp
Vicia rigidula Royle	-	H	WP	Fodder	Reg Himal
Vigna vexillata (L.) A. Rich.	-	H	Rt, Sd	Medicinal (Cholera, ulcers); Edible	Geront Trop
Lythraceae					
Woodfordia fruticosa (L.) Kurz	-	Sh	St, Fl, Rt	Medicinal (Bone fracture, burns, cholera, cough, dropsy, dysentery, fever, haemorrhage, injuries, mennorhoea, muscle pain, nausea, night blindness, fever, rheumatism, skin disease, small pox, sores, spleen complaints, sprain, ulcer wounds, veterinary sores); Edible	As et Afr Trop
Melastomataceae					
Osbeckia stellata Buch.-Ham. ex D. Don	-	Sh	Rt, Lf	Medicinal (Cough, digestion, dysentery, nose bleeding, snake bite, wounds, stomachache, toothache)	Reg Himal
Menispermaceae					
Stephania glabra (Roxb.) Miers.	Galaukadi	H	Tu	Medicinal (Asthma, dysentery, fever)	As Trop
Moraceae					
Ficus hederacea Roxb.	-	Sh	Wd, Lf	Fodder; Fuel	Reg Himal Burma
F. neriifolia Sm.	-	T	Fr, Lf, Wd	Edible; Fodder; Fuel	As
F. roxburghii Wall.	-	T	Lf, Rt, Wd	Edible; Fodder, Fuel	As Trop
Myricaceae					
Myrica esculenta Buch.-Ham. ex Don	Kaphal	T	Bk, Fr, Wd	Medicinal (Asthma, cholera, cough, fever, indigestion, malaria, rheumatism); Edible; Fuel	As Trop et Subtrop
Myrtaceae					
Syzygium cumini (L.) Skeels	-	T	Br, Lf, Sd, Fr	Medicinal (Astrigent, blister in mouth, cancer, piles, pimples, fermentation for rice beer); Edible; Fuel; Household (Various constrution purposes, Dying, Tanning); Religious	As et Austr Trop As Trop
Oleaceae					
Jasminum dispermum Wall. ex Roxb.	-	Sh	Lf	Medicinal (Cuts, wounds); Fodder	Reg Himal
J. humile L.	Juhi	Sh	Fl, Rt, Lf	Medicinal (Sinus, skin, blood, heart disease, ringworm)	As Trop
Orobanchaceae					
Pedicularis pectinata Wall. ex Benth	-	H	WP	Medicinal (Bodyache, sedative)	Reg Himal Persia
Plantaginaceae					
Plantago lanceolata L.	Ishabgol	H	Lf	Medicinal (Blood purifier)	Europe As Bor
P. ovata Forssk.	Jangali isabgol	H	Sd, Husk	Medicinal (Diarrhea, constipation)	Reg Mediterr Oriens
Plumbaginaceae					
Plumbago zeylanica L.	-	H	St, Rt, Fl, La	Medicinal (Abortificant, headache, rheumatism,)	Geront Trop
Poaceae					
Apluda mutica L.	-	H	WP	Medicinal (Mouth sores); Fodder	As Trop Polynesia Austr
Arundinella nepalensis Trin.	-	H	WP	Medicinal (Ointment)	Ind Or

Bothriochloa bladhii (Retz.) S.T. Blake	-	H	WP	Fodder	Oriens Afr et As Trop Austr
B. pertusa (L.) A. Camus	-	H	WP	Fodder	Sicil As et Afr Trop Austr
Digitaria cruciata (Nees) A. Camus	-	H	Lf	Fodder	Reg Bor Temp et Trop Ind Or Cosmop
Eragrostis unioloides (Retz.) Nees.	-	H	WP	Fodder	Ins Banca
Oplismenus compositus (L.) P. Beauv	-	H	WP	Fodder	Cosmop Trop
Oplismenus hirtellus (L.) P. Beauv.	-	H	WP	Fodder	Cosmop Trop
Saccharum rufipilum Steud.	-	H	AP	Fodder; Religious	Reg Calid Cult
S. spontaneum L.	-	H	Lf	Medicinal (Asthma, cholera); Fodder	Geront Trop
Pennisetum glaucum (L.) R. Br.	-	H	Sd	Edible	Europe As Temp
Polygonaceae					
Rumex hastatus D. Don	Aambi	H	Lf	Edible	Reg Himal
R. nepalensis Spreng.	Albar	H	Lf, Rt	Medicinal (Boils, colic, cooling, diuretic, purgative, scurvy, swelling of muscles); Fodder	As Occ Ind Or Malaya Afr
Primulaceae					
Myrsine africana L.	-	Sh	Wp	Medicinal (Pain, Gum tone, Vermifuge)	Reg Himal Afr Austr et Trop Ins Azor
Ranunculaceae					
Clematis buchananiana DC.	Chabru	Sh	Lf, Rt	Medicinal (Skin diseases, sores, tumors)	Reg Himal
C. grata Wall.	-	Cl	AP	Fodder	Reg Himal China Afr Trop
Ranunculus diffusus DC.	-	H	WP	Medicinal (Boils)	Ind Or Malaya
Rhamnaceae					
Rhamnus purpurea Edgew.	Chaunsha	Sh	Fr,Wd, Lf	Medicinal (Purgative); Agricultural tools; Fodder	Reg Himal
Rosaceae					
Agrimonia pilosa Ledeb.	Kuri	H	AP, Rt	Medicinal (Cough, urinary problems)	Reg Bor Temp
Cotoneaster microphyllus Wall. ex Lindl.		Sh	Rt, Lf	Medicinal (Astringent); Fodder; Edible	Reg Himal
Fragaria vesca L.		H	Fr	Edible	Reg Temp
Potentilla fulgens Wall.	-	H	Rt	Medicinal (Astringent, tooth complaints, tonic)	Reg Himal
Prinsepia utilis Royle	Bhekhal	Sh	Sd, Fr	Medicinal (Burns, cuts, rheumatism, wounds); Edible	Reg Himal
Prunus cerasoides Buch. - Ham. ex Don	Pajja	T	Lf, Fr	Fodder; Edible; Fuel; Religious	Reg Himal
Pyrus pashia Buch.-Ham. ex D. Don	Shegal	T	Lf, Fr, Wd	Edible; Fodder; Fuel	Reg Himal
Rosa moschata Herrm.	Kunjaphool	Sh	Rt	Medicinal (Pain); Fuel; Fodder	Oriens
Rubus biflorus Buch.-Ham. ex Sm.	Aachhe	Sh	Fr, Rt	Medicinal (Diarrhoea); Edible	Reg Himal Ind Or
R. ellipticus Sm.	Aachhe	Sh	Fr, Rt	Medicinal (Dysentery, malaria, stomachache, worms); Edible	Ind Or
R. niveus Thunb.	Anchha	Sh	Fr	Medicinal (Stomachache); Edible	Reg Himal
Rubiaceae					
Galium aparine L.	-	H	Wp	Medicinal (Astrigent, skindisease)	Reg Bor Temp et Magell
G. rotundifolium L.	-	H	Ap	Medicinal (Bronchitis, tonsil); Fodder	Europe As Temp
Himalrandia tetrasperma (Wall. ex Roxb.) T. Yamaz.	-	Sh	Fr	Edible	Reg Himal Nepal
Rubia cordifolia L.	-	H	Rt, St	Medicinal (Tonic, astringent, antidote, dysentery)	As Trop et Temp Afr Trop
Rutaceae					
Zanthoxylum armatum DC.	Tirmir	Sh	Fr, Sd	Medicinal (Cough, cholera, fever, eczema, itching, leucoderma, piles, rheumatism, tonic, tooth complaints); Edible; Fuel	Reg Himal China
Salicaceae					
Xylosma longifolium Clos.	-	T	Br, Lf	Medicinal (Stomachache,) Edible; Fuel	Reg Himal
Santalaceae					
Osyris lanceolata Hochst. and Steud.	-	Sh	WP	Fodder	Ind Or
Scrophulariaceae					
Verbascum thapsus L.	Jangli	H	Sd	Medicinal (Asthma, cough, inflammation,	Europe Oriens Reg

	tambakhu			leucoderma, veterinary diseases)	Himal
Buddleja crispa Benth.	Sfed	Sh	Lf, Wd	Fodder; Fuel	Reg Himal Burma
Simaroubaceae					
Brucea javanica (L.) Merr.	Halash, Titri	T	Fr, Wd	Medicinal (Gastric problem, skin diseases); Edible; Fuel	Reg Himal China Ins Sandvic
Smilacaceae					
Smilax aspera L.	-	Sh	Rt, Lf, St	Medicinal (Skin eruptions, sores, wounds); Fuel	Europe Oriens Ind Or
Solanaceae					
Physalis minima L.	-	H	Wp	Medicinal (Abdomin disease, earache, fever, gastric disease, stomachache); Edible	Grant Trop
Symplocaceae					
Symplocos paniculata (Thunb.) Miq.	Lojj	T	Bk, Lf	Medicinal (Astringent); Fuel; Agricultural tools	Reg Himal Burma China
Thymelaeaceae					
Wikstroemia canescens Meissn.	Bhojishel	Sh	Lf, Bk	Medicinal (Piscicidal); Fiber; Paper making	Reg Himal Zeylan China
Daphne papyracea Wall. ex Steud.*	Gandiri	Sh	Rt, Lf	Medicinal (Intestinal complaints); Fodder; Fibre	Reg Himal
Urticaceae					
Debregeasia longifolia (Burm. f.) Wedd.	Shyaru	Sh	Bk, Lf	Fodder; Fibre; Fuel	Ind Or
Parietaria debilis Frost.	-	H	Rt	Medicinal (Dandruff, hair problems)	Reg Trop et Subtrop
Pilea scripta (Buch.-Ham. ex D. Don) Wedd.	-	H	AP	Fodder	Reg Himal
Violaceae					
Viola canescens Wall. ex Roxb.	Banafsha	H	Lf, Fl	Medicinal (Asthma, bronchitis, cold, cough, eye diseases)	Ind Or Malaya China Nepal
Vitaceae					
Parthenocissus semicordata (Wall.) Planch.	-	H	Fr	Edible; Fodder	Reg Himal
Zingiberaceae					
Hedychium spicatum Sm.*	Ban haldi	H	Rh, Lf	Medicinal (Asthma, blood purifier, bronchitis, nausea); Fodder; Misc. (Mats)	Reg Himal
Gymnosperms					
Pinaceae					
Cedrus deodara (Roxb. ex D. Don) G. Don*	Devdar	T	Res, Lf, Wd	Medicinal (Antihelminthic, rheumatism, ulcers); Fuel; Timber	Reg Himal
Pinus roxburghii Sarg.*	Chir	T	Sd, Wd, Res	Medicinal (Boils, bone fracture, cracks in sole of feet, leprosy, skin diseases, snake bite, sprain, swelling, urine complaints); Edible; Fuel; Timber; Agricultural tools	Reg Himal
Pteridophytes					
Aspleniaceae					
Asplenium dalhousiae Hk.	-	Fn	Rh	Medicinal (Typhoid)	
Athyriaceae					
Diplazium esculentum (Retz.) Sw.	Lingdi	Fn	Frd	Medicinal (Constipation); Edible	
Cryptogrammaceae					
Onychium contiguum Wall.	-	Fn	Rh	Medicinal (Typhoid, fever)	
Equisetaceae					
Equisetum arvense L.	-	Fn	WP	Medicinal (Diuretic, haemostat, Dyspepsia)	
Pteridaceae					
Pteris biaurita L.	-	Fn	Frd	Medicinal (Wounds)	
Thelypteridaceae					
Pseudophegopteris levingei Ching	-	Fn	AP	Fodder	

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